

U.S. Department of Energy
Technical Qualification Program

Emergency Management Topical Area

Study Guide

For the

*Nuclear Safety
Qualification Standard*

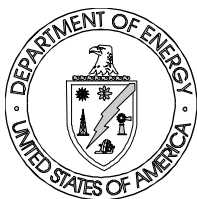
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Competency 2.1 Nuclear safety system personnel shall demonstrate a working level knowledge of Department of Energy (DOE) Order 5000.3B, Occurrence Reporting and Processing of Operations Information, with respect to its impact on Department nuclear safety.

1. Supporting Knowledge and Skills

- a. State the purpose of DOE Order 5000.3B, Occurrence Reporting and Processing of Operations Information.
- b. Define the following terms:
 - Event
 - Condition
 - Facility
 - Notification Report
 - Occurrence Report
 - Reportable Occurrence
- c. Discuss the Department's policy regarding the reporting of occurrences as outlined in DOE Order 5000.3B, Occurrence Reporting and Processing of Operations Information.
- d. State the different categories of reportable occurrences and discuss each.
- e. Discuss the categorization, notification, and timeliness requirements associated with the following:
 - Notification Report
 - 10-Day Occurrence Report
 - Final Report
 - Closing out and verifying Occurrence Reports
 - Processing Occurrence Reports which cross the lines of professional responsibility of electrical systems personnel
 - Contractor Occurrence Reporting Procedures
- f. Discuss the general process for preparing and submitting occurrence reports and their follow-up.
- g. Using Attachment 1 to DOE Order 5000.3B, Occurrence Reporting and Processing of Operations Information, discuss the role of nuclear safety personnel in nuclear safety-related reportable occurrences.



- h. Given an occurrence report, determine the following:
- The adequacy of the review process used
 - That causes were appropriately defined
 - That corrective actions addressed causes
 - That the lessons learned were appropriate
 - That corrective actions have been completed
- i. Using an occurrence report involving nuclear safety activities, identify and discuss the factors contributing to the occurrence.

2. Self-Study Activities (corresponding to the intent of the above competency)

- NOTES:
- The DOE Orders are in a state of transition. Please refer to the following gopher site for a cross reference of new and old Orders:
gopher://VM1.HQADMIN.DOE.GOV:70/00/doemenu1/directiv/251cross.asc
 - Below are two web sites containing many of the references you may need.

Web Sites		
Organization	Site Location	Notes
Department of Energy	http://cted.inel.gov/cted/index.html	DOE Standards, Guides, and Orders.
U.S. House of Representatives	http://law.house.gov/cfr.htm	Searchable Code of Federal Regulations

Read DOE Order 5000.3B, *Occurrence Reporting and Processing of Operations Information*.

Read at least two occurrence reports involving facilities at your site. If possible, these should involve nuclear safety system activities as at least a contributing factor to the cause of the occurrence.

EXERCISE 2.1-A Define “Reportable Occurrence” and the rationale associated with reporting as identified in DOE Order 5000.3B.

EXERCISE 2.1-B Referring to DOE Order 5000.3, describe three categories of Reportable Occurrences and provide an example of the types of events that could lead to each.



- EXERCISE 2.1-C Discuss time requirements for reporting occurrences.
- EXERCISE 2.1-D Describe the elements of the occurrence report.
- EXERCISE 2.1-E Briefly explain the main purpose of the Occurrence Reporting and Processing System (ORPS).
- EXERCISE 2.1-F Using Attachment I of DOE Order 5000.3B, list the nine (9) groups of categorized occurrences.
- EXERCISE 2.1-G Differentiate between “direct cause,” “contributing cause,” and “root cause.”
- EXERCISE 2.1-H List seven categories of causes.
- EXERCISE 2.1-I Describe the responsibilities of the Facility Manager for occurrence categorization and reporting.
- EXERCISE 2.1-J Using an occurrence report and DOE Order 5000.3B as a reference, determine the following:
- That the review process used was adequate
 - Whether causes were appropriately defined
 - Whether corrective actions addressed causes
 - Whether the lessons learned were appropriate
 - Whether corrective actions have been completed

3. Summary

DOE Order 5000.3B, *Occurrence Reporting and Processing of Operations Information*, establishes a system for reporting of operations information related to DOE-owned or -operated facilities and processing of that information to provide for appropriate corrective action.

The Order describes the requirements for reporting and processing of occurrences related to the operation of DOE-owned or -operated facilities, including occurrences related to safety, health, security, property, operations, or the environment, up to and including emergencies.



4. Exercise Solutions

EXERCISE 2.1-A Define “Reportable Occurrence” and the rationale associated with reporting as identified in DOE Order 5000.3B.

ANSWER 2.1-A Reportable Occurrences are events or conditions that (1) affect the health and safety of the public, (2) seriously impact the intended purpose of DOE facilities, (3) have a noticeable adverse effect on the environment, (4) endanger the health and safety of workers, or (5) adversely affect national security or the security interests of DOE.

EXERCISE 2.1-B Referring to DOE Order 5000.3B, describe three categories of Reportable Occurrences and provide an example of the types of events that could lead to each.

ANSWER 2.1-B Emergencies - The most serious occurrences; require an increased Alert status for on-site personnel and, in specified cases, for off-site authorities. Types of events that could lead to an emergency include the following:

- a) any unintentional nuclear criticality that results or could result in actual or potential facility damage or release of radioactive material to the environment;
- b) any actual or potential release of material to the environment that results or could result in significant off-site consequences;
- c) any natural or man-made event posing an actual or potential threat to the integrity of the facility that results or could result in significant off-site consequences;
- d) any event in process or having occurred that involves an actual or potential substantial degradation of the level of the safety of the facility that results or could result in significant off-site consequences;
- e) any safeguards or security event that is an actual or potential threat to DOE operations, facilities, or personnel, and results or could result in significant effects on the public health and safety/or on national security; or
- f) any event that requires activation of the site emergency plan.



Unusual Occurrence - A nonemergency event that has significant impact or potential for impact on safety, the environment, health, security, or operations. Types of events that could lead to an Unusual Occurrence include events which do the following:

- a) result in the release of radioactive or hazardous materials above limits established in, or in violation of, safety, environmental, or health requirements defined in Federal permits, Federal regulations, or DOE standards;
- b) present significant internal or external threats to safety, the environment, health protection, or the ability of a facility to operate;
- c) involve significant degradation of safety class equipment or environmental, safety, security, or health conditions;
- d) result in fatalities, exposures to hazardous or radioactive materials or off-site or on-site contamination that do not meet emergency criteria defined in DOE Order 5500.2B, but are in excess of regulatory limits, failure of environmental monitoring equipment necessary to demonstrate compliance, failure of safety equipment or systems reducing the capability below a minimum required safety function, or significant delay or cost in operations;
- e) result in the actuation of emergency systems or engineered safety features, except under approved testing;
- f) violate technical safety requirements, or involve an unreviewed safety question;
- g) violate DOE safety requirements, environmental requirements, or result in the loss of control or release of radioactive material above allowable limits;
- h) result in the release of a hazardous substance or material that exceeds a reportable quantity and is not Federally permitted as defined in Attachment I of DOE Order 5000.3; or
- i) result in failure or significant degradation of administrative controls that are required to ensure safety, security, or environmental protection.

Off-Normal Occurrence - An abnormal or unplanned event or condition that adversely affects, potentially affects, or is indicative of degradation in the safety, security, environmental, or health protection performance or operation of a facility. Off-Normal Occurrences are those events which do the following:

- a) result in the release of radioactive or hazardous materials below limits established by Federal permits, Federal regulations, or DOE standards, but must be reported in writing to state or local agencies in other than routine monthly/quarterly reports;



- b) are internal or external threats to safety, security, environmental, or health protection or the ability of a facility to operate;
- c) involve degradation of environmental, safety, security, or health conditions;
- d) result in serious personnel injury or significant lost workdays, personnel contamination, assimilation, exposure, or significant on-site or off-site contamination of hazardous or radioactive materials in excess of administrative limits but within regulatory limits, or degradation of environmental monitoring equipment necessary to demonstrate compliance;
- e) result in violation of safety, environmental, or health administrative limits;
- f) involve operational procedural violations, including maintenance and administrative procedures that have the potential to impact the safety, security, environmental, or health performance or operation of a facility; or
- g) involve discovery of a condition that could prevent the functioning of administrative controls necessary to ensure safety or environmental protection.

EXERCISE 2.1-C Describe the notification requirements for Reportable Occurrences.

ANSWER 2.1-C Emergencies - Oral notification to DOE and off-site authorities of emergencies shall be made within 15 minutes or less of categorization; a written notification report shall be prepared and submitted as soon as practical, but in all cases, before the close of the next business day from the time of categorization.

Unusual Occurrences - Oral notification to DOE shall be made as soon as sufficient information is obtained to indicate the general nature and extent of the occurrence, but in all cases, within two hours of categorization; a notification report shall be prepared and submitted before the close of the next business day from the time of categorization.

Off-Normal Occurrences - Oral notification to DOE is not mandatory; a notification report shall be prepared and submitted before the close of the next business day from the time of categorization.



EXERCISE 2.1-D Describe the required elements of the occurrence report.

ANSWER 2.1-D For every Reportable Occurrence, the Facility Manager shall determine and document the following in the occurrence report:

- a) the significance, nature, and extent of the event or condition;
- b) the cause(s) of the event or condition, including the root cause, as appropriate; and
- c) the corrective actions to be taken to correct the condition and prevent recurrence.

EXERCISE 2.1-E Briefly explain the main purpose of the ORPS.

ANSWER 2.1-E The major purpose of the Occurrence Reporting and Processing System is to provide feedback of safety and operational information identified in occurrence reports to other DOE nuclear facilities.

EXERCISE 2.1-F Using Attachment I of DOE Order 5000.3B, list the nine (9) groups of categorized occurrences.

ANSWER 2.1-F The nine groups of categorized occurrences are listed below:

1. Facility Condition
2. Environmental
3. Personnel Safety
4. Personnel Radiation Protection
5. Safeguards and Security
6. Transportation
7. Value Basis Reporting
8. Facility Status
9. Cross-Category Items

EXERCISE 2.1-G Differentiate between “direct cause,” “contributing cause,” and “root cause.”

ANSWER 2.1-G Direct cause - The cause that directly resulted in the occurrence.

Contributing cause - A cause that contributed to the occurrence but, by itself, would not have caused the occurrence.



Root cause - The cause that, if corrected, would prevent recurrence of this and similar occurrences.

EXERCISE 2.1-H List seven categories of causes.

ANSWER 2.1-H Categories of causes:

1. Equipment/material problem
2. Procedure problem
3. Personnel error
4. Design problem
5. Training deficiency
6. Management problem
7. External phenomenon

EXERCISE 2.1-I Identify the responsibilities of the Facility Manager in occurrence categorization and notification.

ANSWER 2.1-I Responsibilities of the Facility Manager in occurrence categorization and notification include the following:

- Categorization of the occurrence utilizing the facility-specific procedures developed in accordance with DOE Order 5000.3B.
- For oral notification, the Facility Manager shall simultaneously contact the DOE Facility Representative and the Headquarters (HQ) emergency operations center (EOC).
- Preparation and submittal of the notification report and distribution of the report to the DOE Facility Representative and Program Manager.

EXERCISE 2.1-J Using an occurrence report and DOE Order 5000.3B as a reference, determine the following:

- That the review process used was adequate
- Whether causes were appropriately defined
- Whether corrective actions addressed causes
- Whether the lessons learned were appropriate
- Whether corrective actions have been completed



ANSWER 2.1-J

Issues	Indicators
Adequacy of the review process	<ul style="list-style-type: none"> • Identification and categorization of occurrence were timely. • Notification and reporting to DOE management were timely. • Significance, root causes, generic implications, and the need for corrective actions were addressed.
Causes were appropriately defined	<ul style="list-style-type: none"> • At least one direct cause is identified. • No more than three contributing causes are defined. • Complete consideration of the cause is provided, including contributory factors, with analysis to show what cause was root to the occurrence and what causes were only contributory. • One of the seven allowable categories of causes was identified.
Corrective actions addressed causes	<ul style="list-style-type: none"> • The corrective actions are directly related to the causes (direct and contributing) defined.
Lessons learned were appropriate	<ul style="list-style-type: none"> • Includes only lessons that others might learn from the occurrence which might be important to other facility operators, or which should be addressed in personnel training or facility procedures. • Lessons learned are directly related to the occurrence.
Corrective actions have been completed	<ul style="list-style-type: none"> • All actions identified to correct the problem are listed, which completed, will prevent reoccurrence • Actual or target completion dates are provided for all the corrective actions listed.